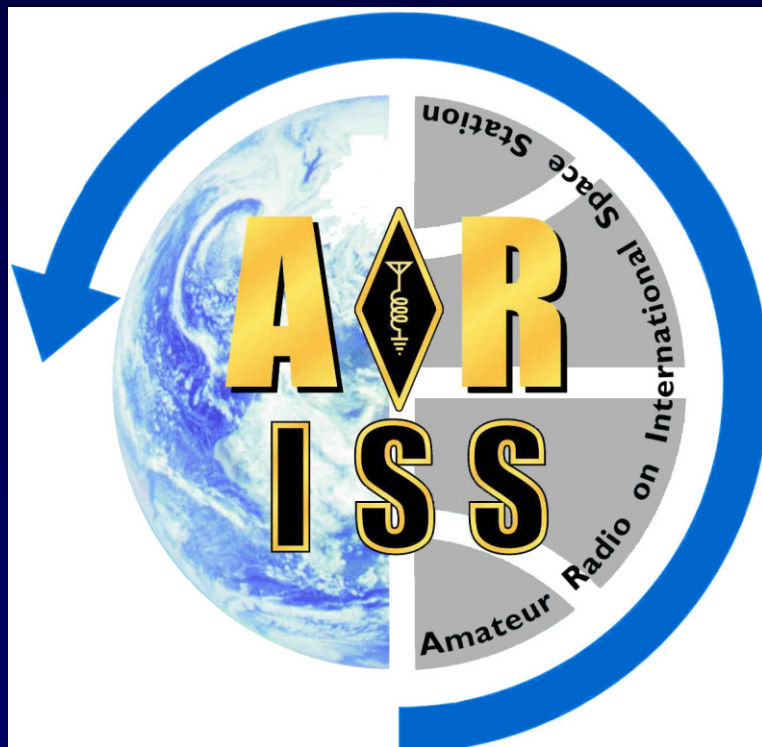


The Future of the ARISS Program: Transforming to Ensure Sustainment



30th AMSAT Symposium
Orlando, Florida
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Frank H. Bauer

Success Strategies to Keep Current, Learn Lessons and Sustain Program

- Know your customers and understand their needs and wants
 - Ham Radio Community
 - NASA
 - International Space Agencies
 - Students
 - Teachers
 - Congress
- Understand your environment and make course corrections as necessary
- Meet your commitments
 - Educational Outreach
 - Ham Radio Operations
 - Hardware and software deliverables
 - Customer Metrics

Sustaining the ARISS Program: Strategic Questions to Ask

- What is the current state of the program?
- Where is NASA and the international space agencies going?
- What does NASA think about ARISS and how we can improve ARISS?
- Is this program sustainable?

Special Delivery!!



**VHF 2-way Voice in the
FGB (Zarya) Module**

Sustaining the ARISS Program: Strategic Questions to Ask

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The Changing State of ARISS

Original, primary goals of ARISS Program

School Group Educational Outreach Activities

- We inspire students, families & the local community, creating learning opportunities & enlightening inquisitive minds through school contacts with the ISS crew

Crew psychological factors

- We provide a unique opportunity for the ISS crew to conduct casual conversations with non-project related individuals, including friends and family. This boosts the crew's morale by reducing the sense of isolation.

Experimentation

- We provide a testbed for development of new communications techniques which can be used to develop new educational projects

International Good Will

- We provide an outstanding forum to enable international technical partnerships; ISS contacts to schools and amateur community fosters international good will

Emergency Backup

- Provide emergency backup to ISS communications systems

The Changing State of ARISS (continued)

Original, primary goals of ARISS Program

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- We inspire students, families & the local community, creating learning opportunities & enlightening inquisitive minds through school contacts with the ISS crew
- **Current Status—still a primary goal**

O Crew psychological factors

- We provide a unique opportunity for the ISS crew to conduct casual conversations with non-project related individuals, including friends and family. This boosts the crew's morale by reducing the sense of isolation.
- **Current status—Not really a goal anymore. IP Phone eliminated friends and family connections, except for Space Flight Participants; IP Phone and other entertainments limited voice QSOs to only those crew members very interested in ham radio ops; on-board E-mail capability curtails/eliminates crew use of packet mailbox**

The Changing State of ARISS (continued)

Original, primary goals of ARISS Program

Experimentation

- We provide a testbed for development of new communications techniques which can be used to develop new educational projects
- **Current Status—a less important goal; NASA developed ISS Software Defined Radio system (3 different radios) which provides a flexible communication testbed for government, industry and educational institutions**

International Good Will

- We provide an outstanding forum to enable international technical partnerships; ISS contacts to schools and amateur community fosters international good will

• **Current Status—Still a primary goal**

Emergency Backup

- Provide emergency backup to ISS communications systems
- **Current status—A less important goal. Multiple, diverse communications systems in multiple ISS segments reduces ARISS emergency backup requirement**

Other ARISS Considerations

Formal Agreements

- Numerous NASA documents define interactions of ISS Ham Radio into the ISS processes (Operations, Crew Training, etc)
- ISS Ham Technical Team Charter (1999) defines the Roles and Responsibilities of NASA, Energia (Russia) and ARISS
- Despite numerous attempts over 15 years, no formal agreements in place between NASA, ARRL and AMSAT on ARISS. Or between all the international partners. This results in:
 - Lack of clarity of Roles and Responsibilities
 - Impression that this is not a “Real” program
 - Potential for unmet expectations
 - Risk to program sustainment
 - Risk to funding from NASA, ARRL & AMSAT

Need US & international agreements in place ASAP

Sustaining the ARISS Program: Strategic Questions to Ask

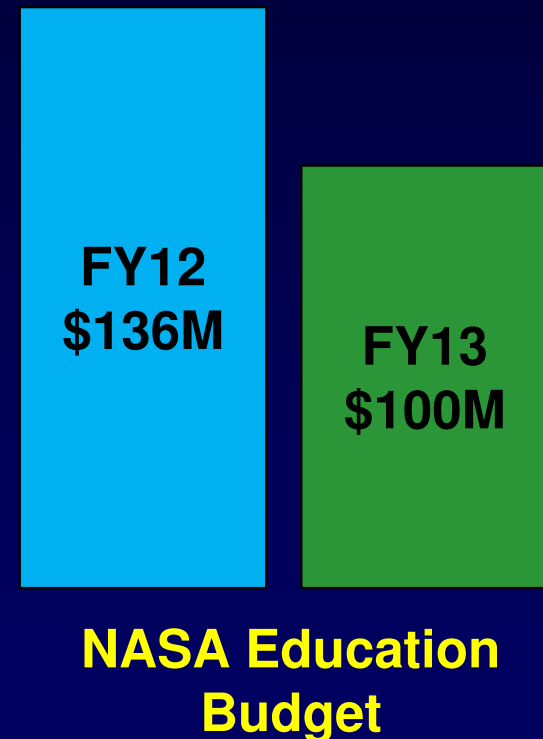
- What is the current state of the program?
- Where is NASA and the international space agencies going?
- What does NASA think about ARISS and how we can improve ARISS?
- Is this program sustainable?

Recent NASA Changes to ARISS

- June 2010—ARISS moved from ISS flight crew equipment to become an educational payload under the ISS National Laboratory education program
 - Dual education leadership from ISS National Lab and Teaching From Space
- 2010—AMSAT asked to step up and provide educational outreach support
 - Excellent leadership by Mark Hammond, starting in 2011, has helped AMSAT meet our customer's expectations
- 2011—Hardware safety support dropped due to financial concerns and ARISSat-1 hardware certifications overruns
 - Reduces US team's ability to build and fly hardware on human spaceflight vehicles unless we get certification support from other members of the international team or unless AMSAT pays for it
- March 2012—All NASA support for ARISS changed from ISS Program/Education shared support to only Education
 - Operations support moved from ISS to education
 - **Adds more financial burden to education**

Current State of NASA Education

- Significant Cuts in Education Budget in FY13
- Large parts of budget “untouchable”—grants to Underrepresented institutions; Congress & White House dictates
- ARISS funding is in jeopardy→will require shifts in program roles



Additional NASA Education Considerations

- NASA Education is totally restructuring its programs
- Several successful, high profile programs have been cancelled (National Explorer Schools)
- While still a high priority for NASA Education, it is only recently emerging where ARISS fits in this restructuring

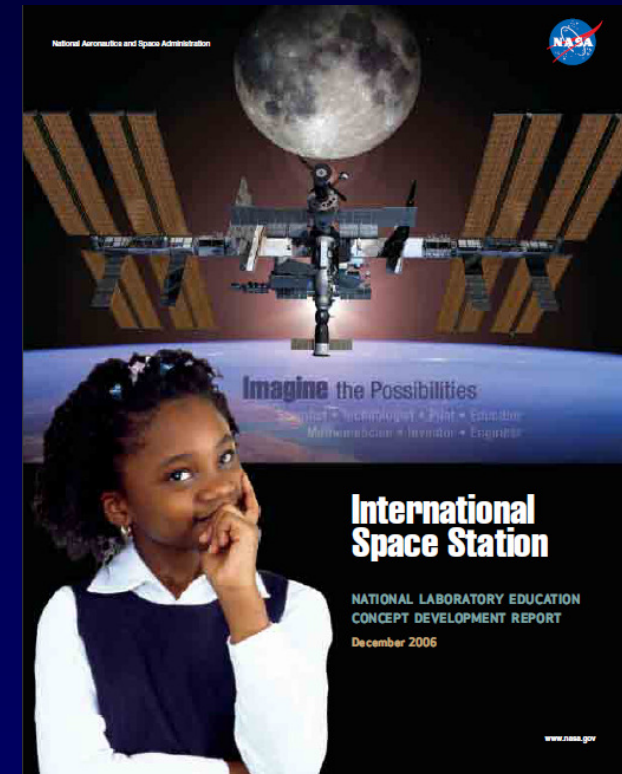
ISS National Lab

- 2005 NASA Authorization Act, designated the US segment of the ISS as a national laboratory, and directed NASA to develop plan to “increase the utilization of the ISS by other Federal entities and the private sector through partnerships, cost-sharing agreements, and any other arrangements **that would supplement NASA funding of the ISS.**”
- Builds new relationships between NASA and the Federal and private leaders in national priorities of education, research and technology, and economic development
- Will open new paths for the exploration and development of space
- The ISS National Laboratory Education Project developed as a viable mechanism to help future generations journey into the space age.
- Uses ISS resources to inspire, engage and educate students, teachers and faculty in the areas of science, technology, engineering and mathematics (STEM)

From 2009 AMSAT Symposium Presentation

ARISS and ISS National Lab

- ARISS capabilities, team and infrastructure provides a very low-cost, high payback ISS National Lab educational opportunity to NASA
 - Would support the ISS National Lab education project
 - Would inspire, engage and educate students, worldwide
- ARISS team supported the development of the ISS National Lab Education Project as a member of the ISS Education Coordination Working Group and as consultants to the initiative
- ARISS interest has been expressed by agencies interested in the ISS National Laboratory participation
 - E.g. Dept. of Agriculture



From 2009 AMSAT Symposium Presentation

Sustaining the ARISS Program: Strategic Questions to Ask

- What is the current state of the program?
- Where is NASA and the international space agencies going?
- **What does NASA think about ARISS and how we can improve ARISS?**
- Is this program sustainable?

Feedback and Reflections from NASA

- NASA is very pleased with the current educational outreach depth of ARISS with its school contacts
 - Very good educational bang for the buck
- ARISS will be competing with many others for dwindling Education dollars→**ARISS needs to further improve our educational impact to remain competitive**
 - **Not more school contacts, but more student involvement**
 - **Need to prove to NASA, OMB and Congress that we are spending government \$ wisely**
- Be patient with Education as they work through their restructuring and their funding cuts
- It is Education's intent to maintain the ARISS core business of educational outreach; it not their intent to “throw the baby out with the bathwater”
- NASA is very interested in ARISS developing a strategic plan (2 & 5 year plan)

Feedback and Reflections from NASA (2)

- Unmet expectations and significant cost overruns to NASA education on ARISSat-1 have really hurt ARISS
- 2 Major Changes Have Challenged ARISS sustainability
 - Changing to a payload from flight crew equipment
 - Moving from ISS Program Office to ISS National Lab
- NASA is providing too much handholding to support ARISS as compared to 15+ other education programs,
 - NASA is happy that AMSAT assigned new leadership on ARISS
 - They would like him to help “herd the cats” and reduce NASA’s participation in non-education efforts

Feedback and Reflections from NASA (3)

- ARISS is expected to be part of NASA Education's "STEM Engagement" Portfolio
 - **Supports K-16**
- Expect to see ARISS go through competitive process for follow-on support from NASA and/or for additional hardware development support
 - 3 year cycle with yearly project reviews
 - Enables NASA to weed out mediocre activities
 - All proposals (including hardware) will require detailed plan for how effort will make an educational impact and will require detailed budget
 - Budget overruns could result in cancellation

Sustaining the ARISS Program: Strategic Questions to Ask

- What is the current state of the program?
- Where is NASA and the international space agencies going?
- What does NASA think about ARISS and how we can improve ARISS?
- **Is this program sustainable?**

Is This Program Sustainable?

- Yes!!
- ARISS' strong international partnerships and outstanding educational outreach efforts significantly improves ARISS sustainability
- But.....

Is This Program Sustainable? (2)

- But.....
- ARISS is in very dynamic, constantly changing environment that requires modified strategies
- Roles between NASA, ARRL, AMSAT & the Internationals, including financial roles, need to change if ARISS is to survive
- AMSAT Needs to Make the Changes Necessary to Ensure ARISS Sustainability and Success
 - ***Enhance Educational Outreach Even Further***
 - ***Pursue outside foundation funding options***

AMSAT VP for Human Spaceflight Near-Term Sustainment Priorities

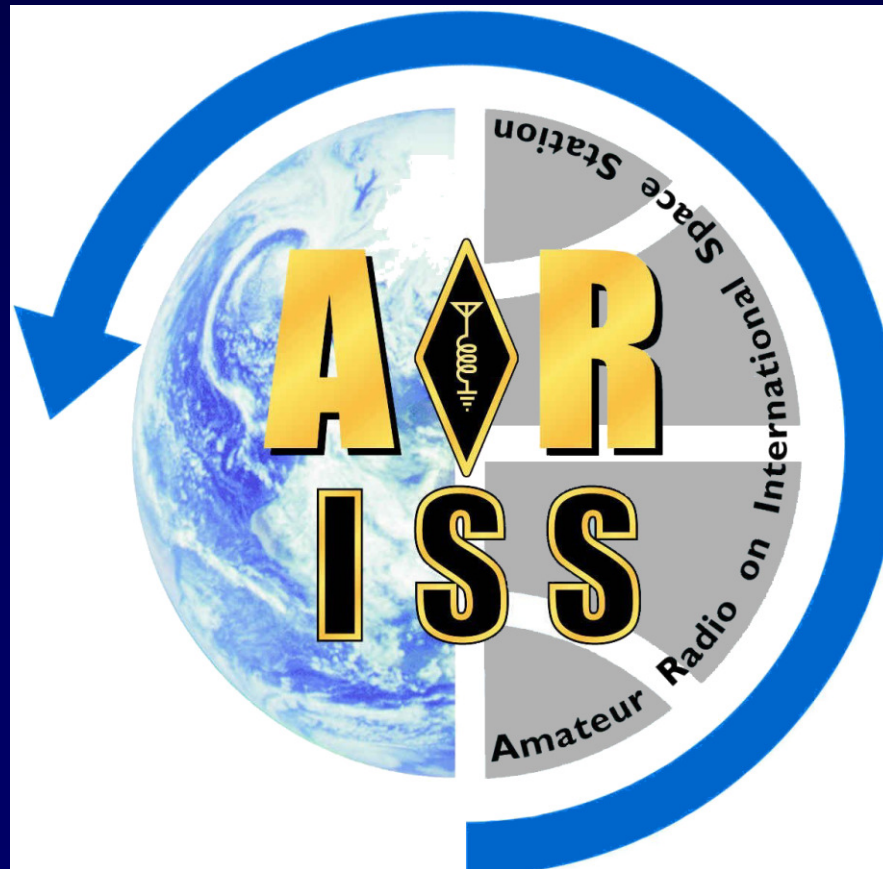
- Get signed agreements in place with NASA and with International Space Agencies
- Work with NASA, ARRL and ARISS-I Working Group to shift roles & responsibilities to sustain ARISS
- Develop Educational Foundation Grant Proposal Strategy
- Work with Mark Hammond and with the ARRL to continue to improve educational impact of school contacts & to enhance overall educational impact
- Survey the team & facilitate improvements in ARISS; work with AMSAT BoD on planning for sustainment
- **Recruit additional team members for development, operations, outreach & education**

Summary

- ARISS is in very dynamic, constantly changing environment that requires modified strategies
- ARISS' strong international partnerships and outstanding educational outreach efforts significantly improves ARISS sustainability
- NASA's Education budget has been significantly reduced
- AMSAT & ARRL Needs to Make the Changes Necessary to Ensure ARISS Sustainability and Success
 - Enhance Educational Outreach Even Further
 - Pursue outside foundation funding options
- **We need to augment our team for development, operations, outreach & education—Please Volunteer!**

ARISS Information

<http://www.ariss.org>



Backup

ARISS Survey Results

- Over 22, 000 students participated in ARISS contacts in FY '12
- 78% of educators believe ARISS contacts stimulates student interest in STEM.
- 92% of educators believe ARISS contacts provide ideas for encouraging students exploration, discussion, and participation.
- 72% of educators believe they will be more effective teaching STEM concepts that were introduced during the activity
- 76% of educators say they can immediately apply what they learned to their STEM teaching